COBRA
Slim

User's Manual
Preliminary

Release 1.0

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Photobiological Safety

Safety Message

The following message to our clients is required by IEC photobiological safety standards for LED sources.

Important Safety Message for COBRA Slim Illuminator users:

The COBRA Slim Illuminator is a LED-based radiation source, intended for use as an OEM component. It must be used only inside a system such as, for example, a machine vision system, and must never be used as a stand-alone product outside of the intended machine vision system.

Until further notice from StockerYale, you must consider that your COBRA Slim device is classified in Class 1 LED product according the IEC standard mentioned above.

For COBRA Slims emitting at UVA:

WARNING: This product emits ultraviolet radiation. Do not under any circumstances look at or allow your skin to come into contact with the ultraviolet radiation. Your eyes or skin may be damaged.

Certain medications and chemicals can increase an individual's sensitivity to UV radiation. Consult your physician for specific information.

These lamps are not intended for, and should not be used for, diagnostic, therapeutic, or cosmetic purposes.

When handling the 380 or 395-nm-emitting COBRA Slims, wear gloves, garments with sleeves, and wear glasses that have an optical density (OD) equal to 3.

For all COBRA Slim wavelengths:

WARNING: Do not look at exposed lamp in operation. Eye injury can result.

Warning stickers

Below are the contents of warning stickers that are affixed to COBRA Slim Linescan Illuminator devices.

UVA

WARNING: Visible and invisible (UV 365nm, 380nm or 395 nm) radiation is emitted through the window on the device. Skin or eye damage could result. Avoid exposure of eyes and skin to unshielded lamp.

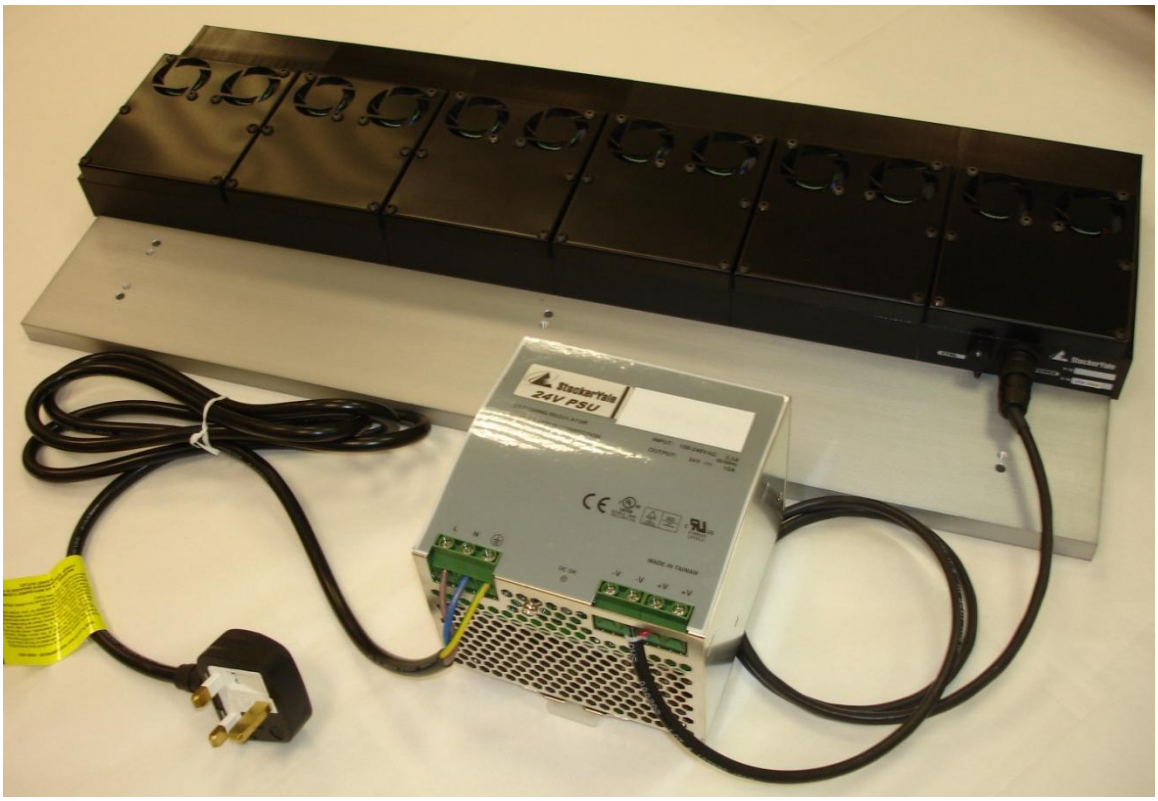
Visible Wavelengths

WARNING: Do not look at exposed lamp in operation. Eye injury could result.

IR 870 nm

WARNING: Invisible (870 nm) radiation is emitted from window on device. Do not look at exposed lamp in operation. Eye injury could result.

Power Supplies and Cables



All wall plugs are available. These include **US**/Japan, UK/Singapore/Malaysia, Europe, Israel, etc. See section below on ordering and part numbers.

Choosing the Correct StockerYale Power Supply

StockerYale recommends the use of the designated 24 Volt power supply, which is a standard COBRA Slim accessory. Since the current regulation function is incorporated within the COBRA Slim units, there is no need for COBRA Slim users to purchase power supplies any more elaborate than those offered by StockerYale. The part numbers and dimensions are as follows:

StockerYale Power Supply	Power Rating	Physical Dimensions
PSU-24V-240W-xx	240 W	125.5mm Width x 100mm Depth x 125.2 mm Height.

To determine the appropriate power supply, refer to the table of DC electrical power requirements in the section entitled “Nominal Electrical and Optical Specifications”, and

calculate the total power required. When using PSU-24V-240W-xx, you may connect up to 5 COBRA Slim Illuminators in parallel to a single 24 V power supply, depending on required wattage.

COBRA Type	Power Rating	COBRA per power supply
COBRA TIL	40W	5 max
COBRA CIL	25W	8 max

Please note that the required Power rating appearing in the table of DC Electrical Power Requirements is the power required in order to deal with the initial power surge that occurs when the COBRA Slim is first powered up.

DIN Rail Mounting of Power Supplies

The PSU-24V-240W-xx ships standard with hardware for mounting on DIN rail TS35/7.5 or 15.

Connecting the Wall Plug Leads to the Power Supplies

The power supply cable leads must be connected to the 3-pole screw terminal block on the power supply. Use a Philips or Pozi head screwdriver. The correct connections are shown in the tables below.

North America/Japan

Color	Function	Label on PSU
Black	Live	L
White	Neutral	N
Green	GND	

United Kingdom/Singapore/Malaysia/Europe/Israel

Color	Function	Label on PSU
Brown	Live	L
Blue	Neutral	N
Yellow/Green	GND	

Power Up Procedure

All wiring and connections must be implemented before plugging the power supply into the wall.

Overview of Connection Schemes

COBRA Slim Illuminators can be used in two basic configurations:

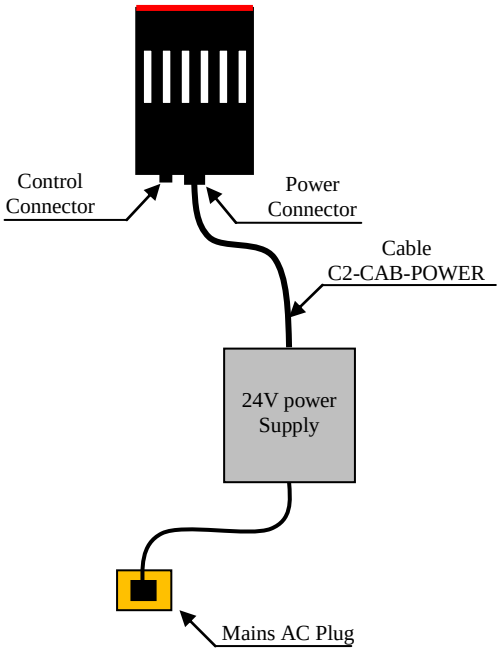
- Without external control;
- With external control:
- Ethernet,

When COBRA Slims are used without external control, the current supplied to the LED circuits is held constant and optical intensity is therefore non-adjustable.

If the optical intensity needs to be adjusted, an Ethernet Controller is available as an option to control COBRA Slims over a network.

Diagrams of COBRA Slim Connection without External Controller

When COBRA Slims are used without external control, the current supplied to the LED circuits from a power supply, via the included COBRA power cable part number C2-CAB-PWR-XXXX is held constant, and optical intensity is therefore non-adjustable.



COBRA Slim without external control.

Pin-out on 2-core COBRA Slim Cable for Use without ECU

Cable C2-CAB-POWER, Wire Color	Power Supply connection
Black	GND (-V)
Red	24 V DC supply (+V)

External Control

COBRA Slim Connector Pin-Out and Functionality

Ctrl connector pin #	Signal
1	Signal GND (200mA max*)
2	Brightness Control. 0 to 4.096V analog (0 to 5V allowed) **.
3	Digital control
4	Digital control
5	Signal 24V (200mA max*)
6	Future use

* Signal GND and 24V can be used to power-up an external device with a maximum current consumption of 200mA. Those 2 pins cannot be used to power-up the COBRA Slim module.
** The Brightness Control pin is 5V compatible; however the maximum brightness is reached with a 4.096V input voltage.

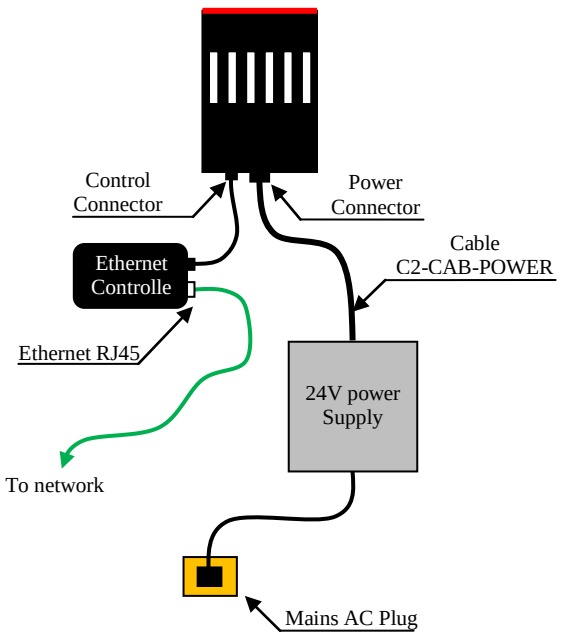
Control connector Pin-Out

Ethernet Control:

An Ethernet controller module can be purchased separately as an option with the product. This module allows users to adjust the optical intensity and to diagnostic the connected COBRA Slims over a network. Also, the optical intensity can be saved into the Ethernet Controller to allow the system to work without a computer connection.

Note: For extended line lengths incorporating more than one Corba Slim module, only one Ethernet control module is needed.

COBRA Slim with Ethernet control.

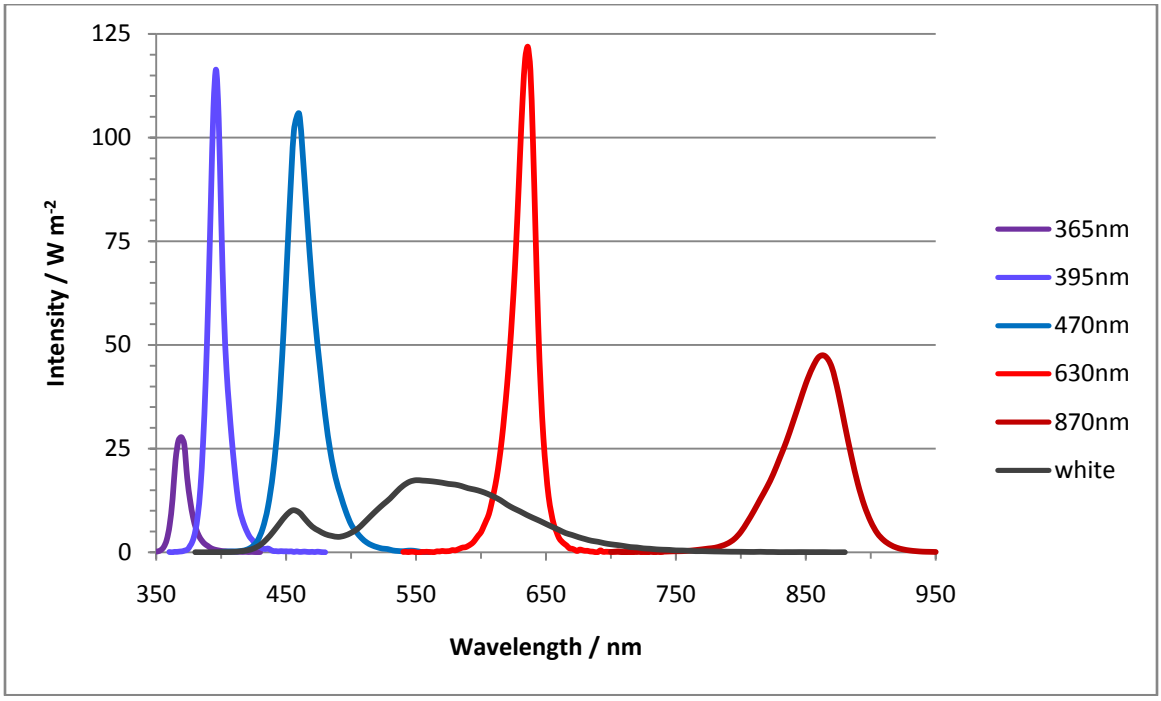


Optical Performance Characterisation:

Spectral Characteristics:

Colour		UV	UV	Blue	Red	IR	White
Peak Wavelength*	[nm]	365 ± 5	395 ± 5	470 ± 10	630 ± 10	870 ± 10	552 ± 10
Spectral Width FWHM	[nm]	12	12	25	19	54	>120
Colour Temperature	[K]	n/a	n/a	n/a	n/a	n/a	5150 – 5350

*nominal wavelengths and tolerance due to thermal shifting



Maximum Irradiance and Illuminance (measured in S9 for **100** mm fan-cooled* units):

		UV_{365}	UV_{395}	$Blue_{470}$	Red_{630}	IR_{870}	White
Irradiance**	W m^{-2}	420	1800	3200	2800	2800	2600
Illuminance	kLux	n/a	n/a	130	560	n/a	975
Lux Scaling Factor		n/a	n/a	41	200	n/a	375
Lux Scaling Wavelength	nm	n/a	n/a	460	627.50	n/a	n/a***

*irradiance for fan-cooled units is approximately 1.85 times greater than convection-cooled units.
**values presented here correlate to the integral of the graphs in the above plot.
***calculated from spectral integration.

Focus and Illumination Field* (**100mm** and **300mm** units):

Lens Position**	Working Distance (wd) for maximum illuminance** [mm]		Linewidths (FWHM) over wd*** [mm]		Focal Distance [mm]	Linewidth (FWHM) at focal distance [mm]
	100 mm	**300 mm**	**100 mm**	**300 mm**		
S1	0-81	0-181	13.0-18.0	13.0-26.0	divergent	divergent
S2	0-91	0-221	12.5-15.0	12.5-17.5	divergent	divergent
S3	0-113	0-300	11.5-13.0	11.5-14.0	divergent	divergent
S4*	0-153	0-300^{+}	8.5-13.0	8.5-13.0	collimated	collimated
S5	0-96	35-154	5.9-13.0	5.3-8.4	194	5.0
S6	42-114	60-135	3.6-6.3	3.3-5.1	140	3.3
S7	57-110	70-116	2.3-3.9	2.3-3.2	109	2.3
S8	55-87	58-90	1.9-2.7	1.9-2.6	88	1.9
S9	53-79	55-81	1.5-2.1	1.5-2.0	74	1.5

* For S1-S4 range is for 50% or higher intensity. For S5-S9 range is for 90% or higher intensity. All data measured with red COBRA. Working distances and focal distances will vary slightly with colour (± 2%) and number of units.

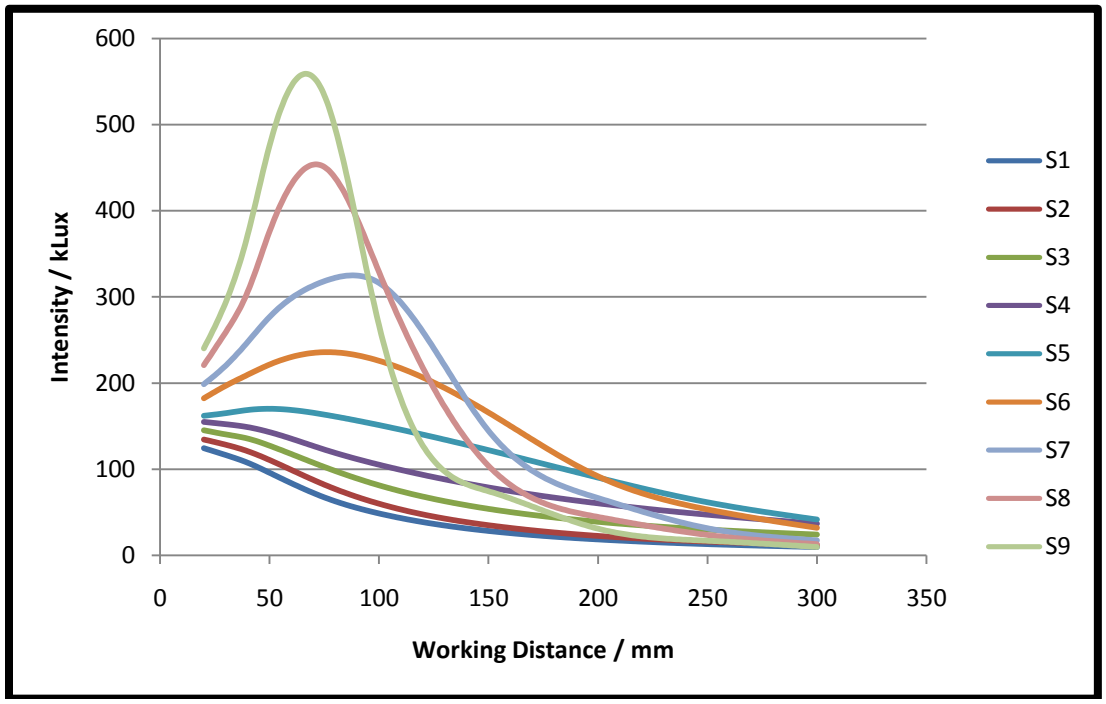
** Positions S1-S3 are divergent i.e. no focus, beam width increases with working distance, while position S4 is the most collimated.

*** See Graph on page 12

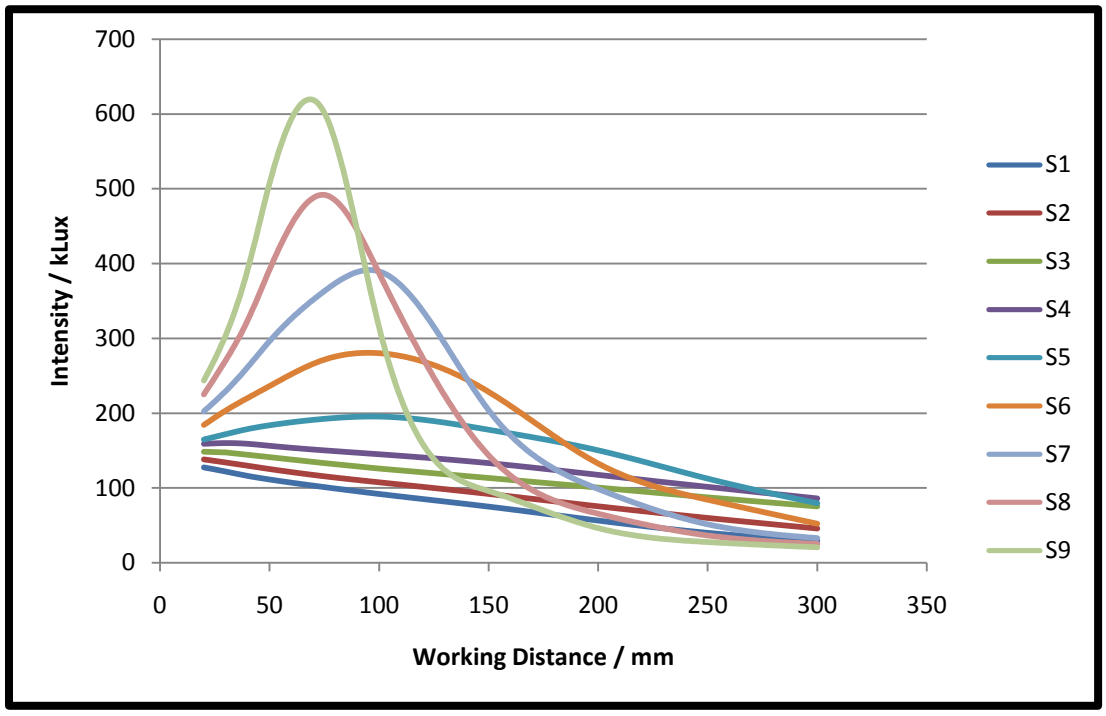
Note: As the LED size and pitch in the white COBRA are different from the coloured units, its behaviour will vary.

Relative Intensity & Line Width vs. Working Distance

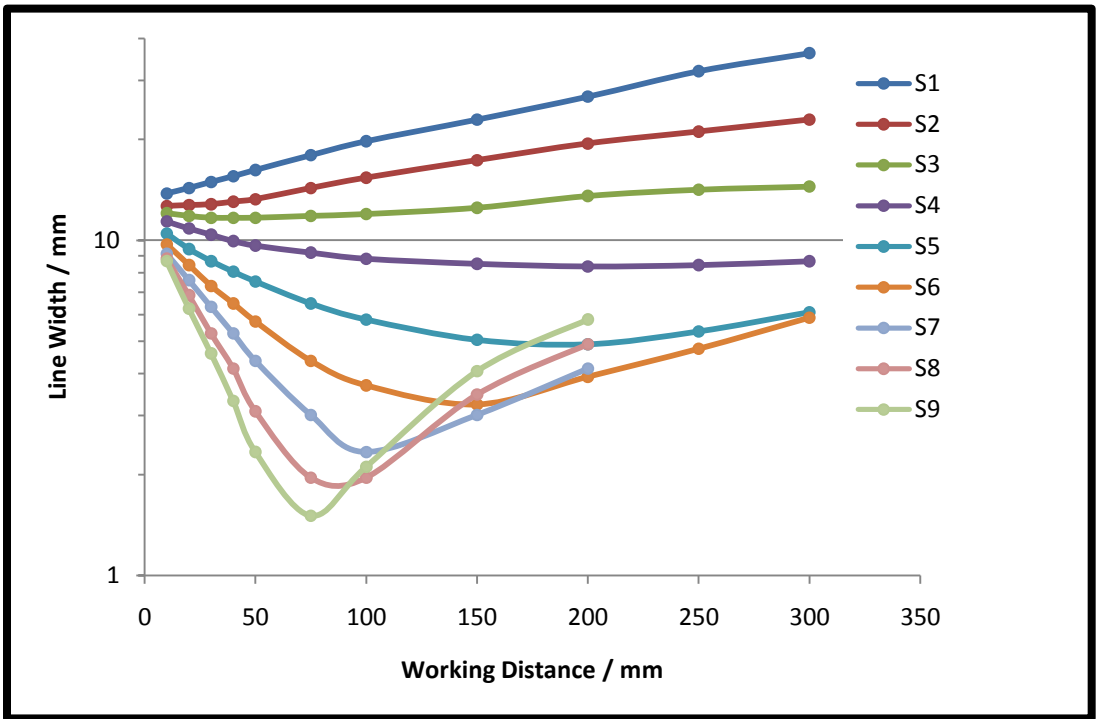
100 mm Unit



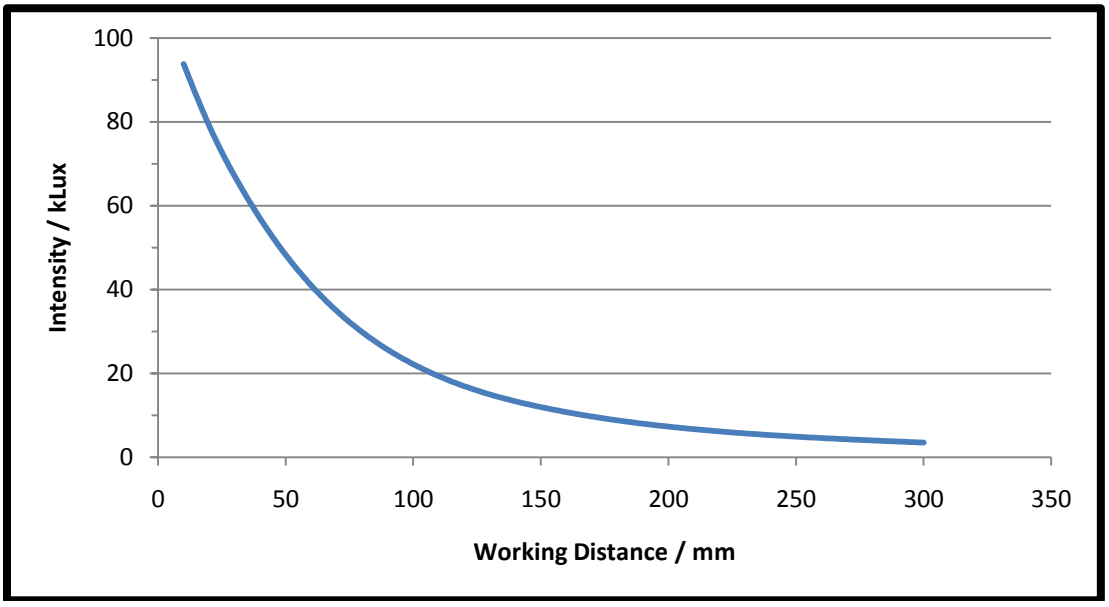
300 mm Unit



Line Widths:



60°x10° Diffuser: (Backlight)



With a diffuser in place the behaviour of intensity with working distance does not vary substantially with lens position or number of units. Therefore the average trend is shown above. However, StockerYale recommends lens position ‘xxx-xxx-xxxx-S2-D1’ for a

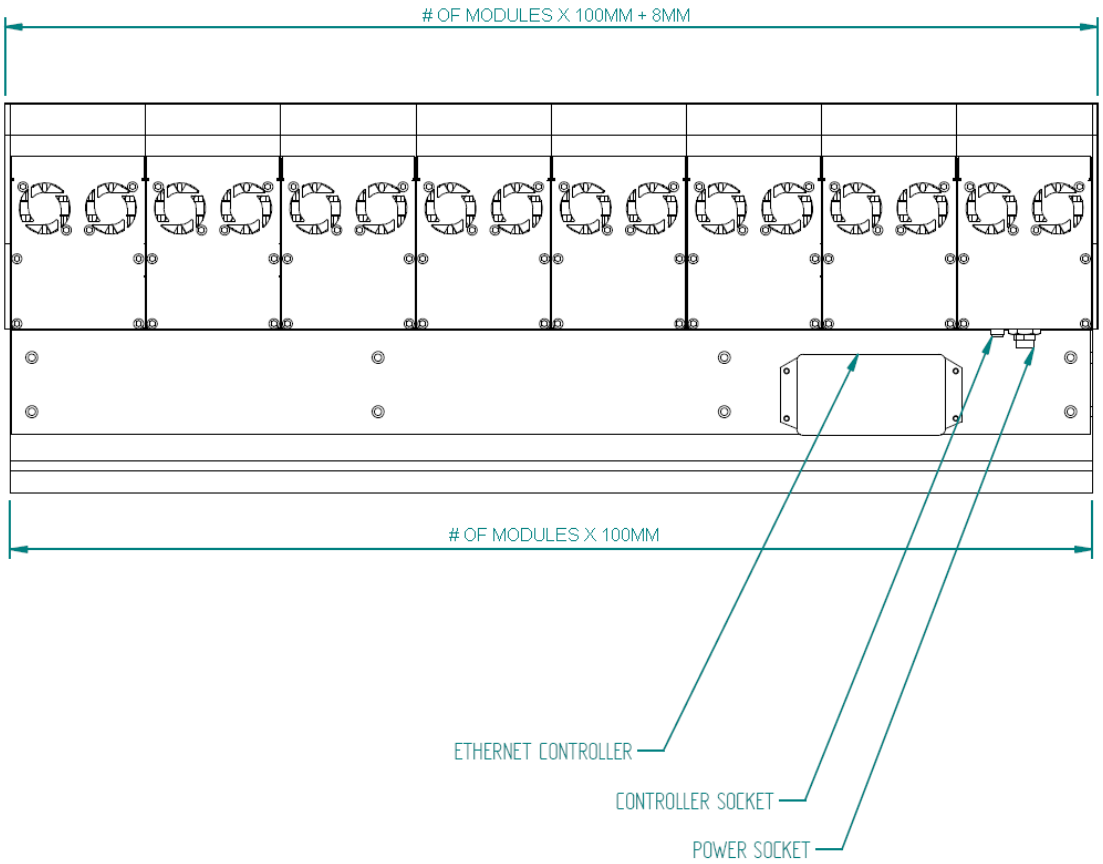
backlight configuration.

These graphs show illumination line thickness (FWHM) and intensity in the field of illumination, as a function of working distance. Intensity measurements were taken using a detector with a 9.5 mm diameter aperture. This was factored in for line widths less than 9.5 mm in the Lux calculation.

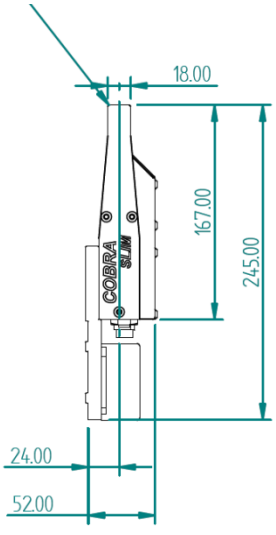
In the transverse direction, the illumination field has a quasi-gaussian distribution. As mentioned, the line thicknesses shown in the graph are defined as FWHM (full-width-half-maximum). As the working distance is increased, the line thickness increases, with an associated decrease in optical intensity.

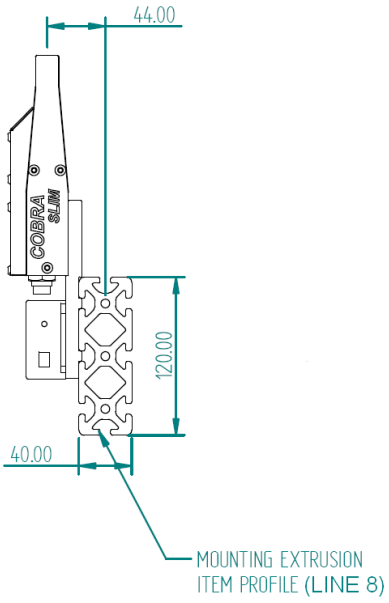
Note: The behaviour of Intensity with Working Distance will be similar for units with 3 or more modules.

Mechanical Dimensions and Mounting



UNIT WITHOUT MOUNTING EXTI





Please ensure there is at least a 3cm gap each side of the units to allow for adequate air flow around the fans.

LED Lifetime

The LED-based COBRA Slim Illuminators are designed so that, if they are operated at a maximum ambient temperature of 35 degrees C, the LED lifetime is 50,000 hours. LED lifetime is defined as the time that it takes for optical intensity to drop from its initial value to one half of that initial value. Running the units in environments having temperatures higher than 35 degrees C will result in the accelerated aging of the LED sources.

Cleaning or Replacing Fans

The fans are reliable, long lasting and the MTBF is 47,500 hours at 40 degrees C.
For instructions on how to clean the fans, please contact StockerYale. Please note that we sell replacement fans and provide instructions on how to install them.

Cleaning or Replacing Lens, Optical Windows

For instructions on how to clean the optical window, please contact StockerYale. Please note that we sell replacement windows and provide instructions on how to install them.

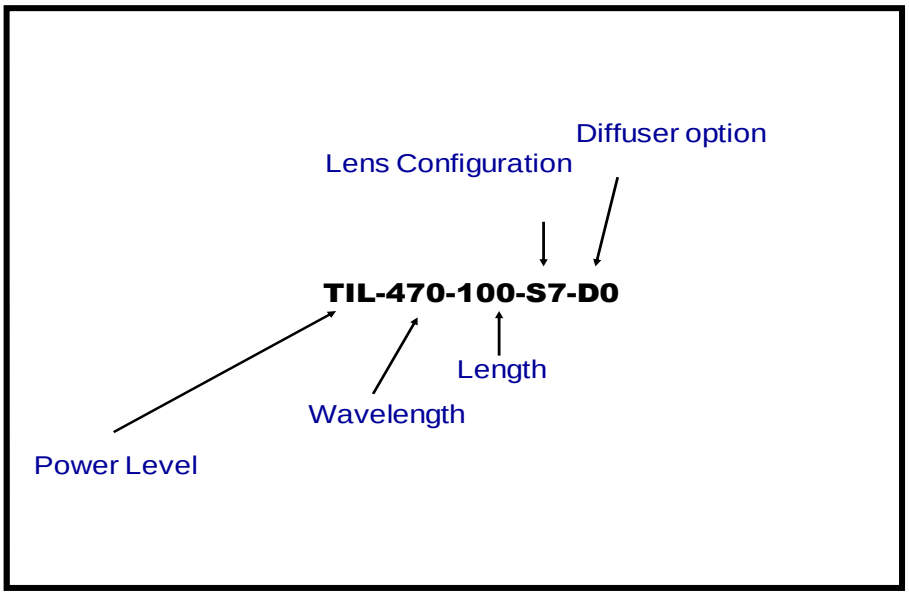
Warranty

Do not attempt to disassemble your COBRA Slim Illuminator before contacting StockerYale. Any such action will void the warranty.

COBRA Slim Illuminators and accessories are guaranteed by StockerYale to be free from material and manufacturing defects for standard warranty period from the date of shipment. Should a product fail during this period, StockerYale will, at its discretion, either repair or replace the damaged unit. Repaired units or replacement units will be covered for the remainder of the original warranty period. The warranty does not apply to units that have failed due to abuse, acts of God, mishandling, alteration, improper installation, or negligence.

Ordering and Part Numbers

Part Number Structure



Part Number Options

Power Level	Wavelength (nm)	Length (mm)	Optical Configuration	Diffuser Options
CIL (Convection-Series) **TIL** (Turbo (Fan)-Series) **WIL** (Water- Series)	**365 470 630 870 000**	**100 to 3000***	**S0—S9 ****	**D0 –D9**

* In 100mm modules.
** Refer to technical data sheet Power Vs working distance for each optical configuration.

Power Supply Part Numbers

For all COBRA Slim devices, the appropriate standard power supply is 24V.

Products	Part Number
240 Watts Power Supply	PSU-24V-240W-xx*

*Add Country or Region signifier to the part number as per following table.

Plug Type Part Numbers

Country or Region	Signifier
Europe	**EU**
United Kingdom, Singapore, Malaysia	**UK**
Israel	**IL**
North America/Japan	**US**
No plug	**X**

COBRA Slim Accessory Part Numbers

Accessories: Power Supplies and External Control Unit	**Stand Alone Part Number**
External Ethernet control unit	C2-ETH-01
Additional power supply cable 100cm-500cm	C2-CAB-PWR- XXXX (XXXX = Length in CM)

Contact Information

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